69P
p. 2

THE PLANT DISEASE REPORTER

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PLANT DISEASE EPIDEMICS
and
IDENTIFICATION SECTION

AGRICULTURAL RESEARCH SERVICE

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FIFTH REVISION OF THE INTERNATIONAL REGISTER OF PHYSIOLOGIC RACES OF PUCCINIA RUBIGO-VERA (DC.) WINT. F. SP. TRITICI (ERIKS.) CARLETON = (P. TRITICINA ERIKSS.)[1]

Supplement 233

October 15, 1955

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THE PLANT DISEASE REPORTER

PLANT DISEASE EPIDEMICS AND IDENTIFICATION SECTION

Horticultural Crops Research Branch Plant Industry Station, Beltsville, Maryland

FIFTH REVISION OF THE INTERNATIONAL REGISTER OF PHYSIOLOGIC RACES OF PUCCINIA RUBIGO-VERA (DC.) WINT. F. SP. TRITICI (ERIKS.) CARLETON = (P. TRITICINA ERIKSS.)[1]

C. O. Johnston and M. N. Levine

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The international register of physiologic races of Puccinia rubigo-vera (DC.) Wint. f. sp. tritici (Eriks.) Carleton = (P. triticina Erikss.), the cause of leaf rust of wheat, was last revised in 1951 (7)[2]. Before that there had been periodic additions and revisions (4, 5, 6, 8), following the original description of physiologic races in the leaf rust of wheat by Mains and Jackson (9) in 1926. It is not the intention to review here all of the literature pertaining to physiologic specialization in P. rubigo-vera tritici but merely to cite the source of the original descriptions of new races that are available.

The fourth revision of the international register brought the number of races described to 132. This revision increases the number to 163. An additional 31 races described within four years indicates a continued and possibly increasing interest in leaf rust of wheat in various parts of the world.

Physiologic races 133 to 138, inclusive, were described by Waterhouse (17) in 1952. Races 133, 134, 136, and 137 were obtained from collections in New Zealand, race 135 from collections in both New Zealand and New South Wales, Australia, and 138 from a collection in New South Wales. Waterhouse also described one or more biotypes of each race determined by the addition of Thew or Gaza to the list of standard differential varieties.

Races 139 to 142, inclusive, were described by Brown and Johnson (2) in Canada in 1949. These were isolated in the course of an investigation of the variation in pathogenicity in the leaf rust of wheat under varying greenhouse conditions, but some of the races later were found under natural conditions in the field. Race 143 was discovered by Brown and Johnson in greenhouse studies in Canada in 1952, but the results were not published. A. R. da Silva (13) described Race 144 in 1951 and races 145 to 150, inclusive, were described in a mimeographed report (14) in 1952. All of the races were found in Brazilian collections.

Races 151 to 153, inclusive, were described by Sibilia (11) in 1942 from collections on wheat in Italy. Sibilia (12) also described race 154 in 1939 from a collection in Ethiopia. These four races were overlooked in earlier revisions of the international register of races. Races 25 and 127 also were found in Ethiopia.

The remaining races all were described from collections made in Western and Southern Europe in recent years. Race 155 was described in 1954 by Hassebrauk (3) from a collection in western Germany. Race 156 was described in 1952 by Urries and Cañamas (15), as race A arising from a Spanish collection. They also described races B, C, and D but stated in correspondence later that further experiments indicated those were not new races. Urries and Salazar (16) continued the preceding work and published the results in 1953. Out of 30 cultures described, four proved to be new. These are here assigned the numbers 157 to 160, inclusive. Race number 161 was assigned to a combination of cultures 67b and 68 described by Basile, Leonori-Ossicini, and Rosa (1) in 1954. These authors described several other cultures as possible new races but careful study indicated they probably were only variants of races already described. Race 162 was described in 1954 by Salazar (10) as race E obtained from collections made in Barcelona and Valencia provinces of Spain. He also lists race A which seems to be the same as race 156 described by Urries and Cañamas. Number 163 is assigned to a culture isolated by Cesare Sibilia in Italy in 1954. It has not been described in literature, but the data were furnished by Sibilia in correspondence regarding his culture num-

[1] Field Crops Research Branch, Agricultural Research Service, United States Department of Agriculture in Cooperation with the Agricultural Experiment Stations of Kansas and Minnesota.

[2] Figures in parentheses refer to "Literature Cited," p. 119.

ber 139. A summary showing the author and year of publication of all races described to date is given in Table 2. The culture and race designations used in the original descriptions of the 31 new races are listed in Table 3. Many other cultures were listed as new races by the authors of those publications but most of them are judged to be merely variations of races already described.

There has been considerable use of supplemental differential varieties by investigators in various parts of the world in recent years. These were used for special reasons, usually concerned with problems related to breeding resistant varieties. In the third and fourth revisions of the international register recognition was given to the supplemental variety Thew and races 95, 96, and 97 were separated by that variety. After careful consideration it seems best to confine physiologic race descriptions to the 8 basic differential varieties selected by Johnston and Mains (8). Therefore race 95 would be considered as a sub-race of race 26 and races 96 and 97 as sub-races of race 68. The eight differential varieties are as follows:

Winter wheat	Spring wheat
Malakof C.I. 4898	Carina C.I. 3756
Hussar C.I. 4834	Brevit C.I. 3778
Mediterranean C.I. 3332	Webster C.I. 3780
Democrat C.I. 3384	Loros C.I. 3778

The winter varieties are typical of common wheat Triticum vulgare Vill., while the spring varieties, also T. vulgare, are of Asiatic types differing considerably from the ordinary wheats of Europe and America.

The reaction classes used in the analytical key are based upon the infection types as listed below:

resistant = 0, 0-1, 1-, 1, 1+, 2-, 2, 2+, 1-2, 0-2
intermediate or variable = x, 1-3, 1-4, 2-3, 2-4, 1-x, 2-x, x-3, x-4
susceptible = 3, 3+, 4-, 4, 4+, 3-4, 3-4+, 4-3

Analytical key for the identification of physiologic races of Puccinia rubigo-vera tritici determined on the basis of their parasitic behavior on differential varieties of Triticum vulgare

	Race No.
Malakof resistant	
Carina resistant	
Brevit resistant	
Webster resistant	
Loros resistant	
Mediterranean resistant	
Hussar resistant	
Democrat resistant	1, 16*
Democrat susceptible	124
Hussar susceptible	53
Mediterranean susceptible	
Hussar resistant	
Democrat resistant	92
Democrat susceptible	15
Hussar intermediate or variable	34
Hussar susceptible	2
Loros intermediate or variable	
Mediterranean resistant	74
Mediterranean susceptible	3
Loros susceptible	
Mediterranean resistant	
Democrat resistant	38
Democrat susceptible	33
Mediterranean intermediate or variable	44
Mediterranean susceptible	
Hussar resistant	
Democrat resistant	163
Democrat susceptible	161
Hussar susceptible	141
Webster intermediate or variable	
Hussar resistant	90
Hussar intermediate or variable	136
Webster susceptible	
Loros resistant	159
Loros susceptible	
Mediterranean resistant	139
Mediterranean susceptible	140
Brevit intermediate or variable	
Loros resistant	63
Loros intermediate or variable	
Mediterranean resistant	79
Mediterranean intermediate or variable	111
Mediterranean susceptible	102
Loros susceptible	32
Brevit susceptible	
Webster resistant	

*Can be separated by variety Thew.

	Race No.
Loros resistant	
Hussar resistant	123
Hussar susceptible	120
Mediterranean susceptible	
Hussar resistant	25
Hussar intermediate or variable	59
Hussar susceptible	62
Loros susceptible	
Mediterranean resistant	
Hussar resistant	11
Hussar susceptible	
Democrat resistant	14
Democrat susceptible	51
Mediterranean susceptible	
Hussar resistant	
Democrat resistant	156
Democrat susceptible	58
Hussar susceptible	61
Webster susceptible	157
Carina intermediate or variable	
Brevit resistant	
Hussar resistant	46
Hussar susceptible	133
Brevit intermediate or variable	
Webster resistant	
Mediterranean resistant	132
Mediterranean intermediate or variable	98
Webster intermediate or variable	
Mediterranean resistant	135
Mediterranean intermediate	137
Mediterranean susceptible	81
Webster susceptible	
Loros intermediate or variable	138
Loros susceptible	
Democrat intermediate or variable	142
Democrat susceptible	88
Brevit susceptible	
Webster intermediate or variable	
Mediterranean resistant	106
Mediterranean susceptible	76
Webster susceptible	134
Carina susceptible	
Brevit resistant	
Webster resistant	
Loros resistant	153
Loros susceptible	
Hussar resistant	154
Hussar susceptible	155
Webster susceptible	
Mediterranean resistant	18
Mediterranean susceptible	45

	Race No.
Brevit susceptible	
Webster resistant	
Loros resistant	
Hussar resistant	127
Hussar susceptible	
Democrat resistant	56
Democrat susceptible	151
Loros susceptible	
Mediterranean resistant	
Hussar resistant	131
Hussar susceptible	
Democrat resistant	26, 95*
Democrat susceptible	158
Mediterranean intermediate or variable	78
Mediterranean susceptible	
Hussar resistant	
Democrat resistant	4
Democrat susceptible	84
Hussar susceptible	12
Webster intermediate or variable	
Mediterranean resistant	
Hussar intermediate or variable	72
Hussar susceptible	66
Mediterranean intermediate or variable	
Hussar resistant	75
Hussar susceptible	71
Mediterranean susceptible	
Democrat resistant	55
Democrat susceptible	85
Webster susceptible	
Loros resistant	118
Loros susceptible	
Mediterranean resistant	
Hussar resistant	68, 96, 97*
Hussar susceptible	107
Mediterranean intermediate or variable	87
Mediterranean susceptible	
Hussar resistant	
Democrat resistant	86
Democrat susceptible	143
Hussar intermediate or variable	
Democrat resistant	73
Democrat susceptible	162
Hussar susceptible	
Democrat intermediate or variable	67
Democrat susceptible	57

* Can be separated by the variety Thew

	Race No.
Malakof intermediate or variable	
Carina resistant	
Mediterranean resistant	36
Mediterranean susceptible	100
Carina intermediate	116
Carina susceptible	
Brevit resistant	23
Brevit susceptible	
Webster resistant	
Mediterranean resistant	
Hussar resistant	22
Hussar intermediate or variable	69
Webster susceptible	70
Malakof susceptible	
Carina resistant	
Brevit resistant	
Webster resistant	
Loros resistant	
Mediterranean resistant	
Hussar resistant	93
Hussar susceptible	17
Mediterranean susceptible	
Hussar resistant	5
Hussar susceptible	52
Loros intermediate or variable	103
Loros susceptible	
Mediterranean resistant	
Hussar resistant	37
Hussar susceptible	128
Mediterranean susceptible	
Hussar resistant	126
Hussar susceptible	28
Webster susceptible	
Loros resistant	
Mediterranean resistant	
Hussar resistant	125
Hussar susceptible	121
Mediterranean susceptible	
Hussar resistant	7
Hussar intermediate or variable	60
Loros susceptible	
Mediterranean resistant	
Hussar resistant	9
Hussar intermediate or variable	27
Hussar susceptible	
Democrat resistant	31
Democrat susceptible	99
Mediterranean susceptible	

	Race No.
Hussar resistant	35
Hussar susceptible	130
Brevit intermediate or variable	
Loros intermediate or variable	110
Loros susceptible	83
Brevit susceptible	
Webster resistant	
Mediterranean resistant	
Hussar resistant	50
Hussar susceptible	64
Mediterranean susceptible	
Hussar resistant	105
Hussar susceptible	6
Webster intermediate	148
Webster susceptible	
Loros resistant	119
Loros susceptible	
Mediterranean resistant	
Hussar resistant	152
Hussar susceptible	147
Mediterranean susceptible	
Hussar resistant	8
Hussar susceptible	149
Carina intermediate or variable	
Brevit resistant	41
Brevit intermediate or variable	
Webster resistant	39
Webster intermediate or variable	
Loros intermediate or variable	113
Loros susceptible	
Mediterranean resistant	29
Mediterranean intermediate or variable	
Hussar resistant	65
Hussar susceptible	101
Mediterranean susceptible	89
Webster susceptible	
Mediterranean intermediate	112
Mediterranean susceptible	30
Brevit susceptible	
Webster resistant	
Hussar resistant	160
Hussar susceptible	109
Webster intermediate or variable	
Mediterranean resistant	146
Mediterranean intermediate or variable	80
Mediterranean susceptible	
Hussar intermediate or variable	104
Hussar susceptible	145
Webster susceptible	42

	Race No.
Carina susceptible	
Brevit resistant	
Webster resistant	40
Webster susceptible	
Loros resistant	47
Loros susceptible	
Mediterranean resistant	
Hussar resistant	19
Hussar susceptible	
Democrat resistant	13
Democrat intermediate or variable	24
Mediterranean intermediate or variable	48
Mediterranean susceptible	
Hussar resistant	54
Hussar susceptible	21
Brevit intermediate or variable	
Hussar resistant	82
Hussar susceptible	94
Brevit susceptible	
Webster resistant	
Mediterranean resistant	
Hussar resistant	43
Hussar susceptible	49
Mediterranean susceptible	
Democrat resistant	129
Democrat susceptible	144
Webster intermediate or variable	
Mediterranean resistant	108
Mediterranean susceptible	
Hussar resistant	114
Hussar susceptible	150
Webster susceptible	
Loros resistant	91
Loros susceptible	
Mediterranean resistant	
Hussar resistant	10
Hussar susceptible	
Democrat resistant	20
Democrat susceptible	117
Mediterranean intermediate	115
Mediterranean susceptible	
Hussar resistant	122
Hussar susceptible	
Democrat susceptible	77

Table 1. Reaction of differential varieties of Triticum vulgare to physiologic races of Puccinia rubigo-vera tritici

Physiologic Races	Type of Infection on: Malakof C.I. 4898	Carina C.I. 3756	Brevit C.I. 3778	Webster C.I. 3780	Loros C.I. 3779	Mediterranean C.I. 3332	Hussar C.I. 4843	Democrat C.I. 3384
1	0	0	0	0	0	1	1	0
2	0-1	0-1	0-1	0	0-1	4	3-4	4
3	0-1	0-2	2-2+	0-2	2-4	3-4	0-1	4
4	0-1	4	4	1	3-4	3-4	2-2+	1-2
5	4	0	0-1	0-1	0-1	4	0-2+	4
6	4	2	4	1-2	3	3-4	3	3-4
7	4	1-2	1	4	1	4	1	4
8	4	1	4	4	4	3-4	1	1
9	4	1-2	1-2	4	4	0-1	1-2+	0-1
10	4	4	4	4	4	1-2	1-2	1-2
11	0	2-	3-4	1-2+	3-4	1-2	0-2	0-2
12	0	4	4	1	4	4	4	4
13	4	4	2-	4	4	0	4	0
14	0	2-	4	1	4	0	4	0
15	0	0	0-1	0	0-1	4	0-1	4
16	2	2	2	2	2	1	2	1
17	4	0	0	0	0	0	4	0
18	0	4	2	4	4	0	4	0
19	4	4	2	4	4	0	1	0
20	4	4	4	4	4	0	4	0
21	4	4	2	4	4	4	4	4
22	X	4	4	1-2	4	0-1	0-1	0-1
23	X	4	2	4	4	0	4	0
24	4	3-4	1-2	4	4	0-2	4	X
25	0	2	4	0	2	4	0	4
26	0	4	4	0	4	0	4	0
27	3-4	2	1-2	3-4	3	2	2-3	2-3
28	4	1+	1+	2+	3	4	3	4
29	4	2-3	2-3	2-3	4	1-2+	3	1
30	4	2-3	2-3	3	3-4	4	1-2+	4
31	4	2	1-2	4	4	1-2	3-4	1-2
32	0	2	X	1-2	3-4	4	1-2	4
33	0	1	2+	0-1+	4	2+	1	4
34	0	0	0	0-1	1	4	X	4
35	4	2+	2+	4	4	4	1	4
36	2-3	0	0-2	0	0-2	2+	1-2	2+
37	3-4	2+	2	0-2	3-4	2+	2	2+
38	0	2-2+	1-2	0-1	3-4	2+	1-2	2+
39	3-4	2-3	2-3	0-1	4	3-4	0-1	3-4
40	4	4	2	0	3-4	4	4	2-3
41	4	2-3	2	4	4	2	2	3-4

Physiologic Races	Malakof C.I. 4898	Carina C.I. 3756	Brevit C.I. 3778	Webster C.I. 3780	Loros C.I. 3779	Mediterranean C.I. 3332	Hussar C.I. 4843	Democrat C.I. 3384
	Type of Infection on							
42	4	2-3	3	4	4	3-4	4	4
43	4	3	3	1-2	4	1	2	1-2
44	0	2	2	0-2	4	X	0-1	4
45	0	3-4	2+	4	4	3-4	2	3-4
46	0-1	2-3	2	0-1	4	2	1-2	3-4
47	4	3	2	4	0	2	0	2
48	4	3-4	2	4	4	2-3	2	0
49	4	3	3	2	3-4	0	4	0
50	4	2	4	2-	3	0	2	0
51	0	1	3	1	3	2	3	3
52	4	0	1	0	1	4	3	4
53	0	1	2	1	1	0	3	0
54	4	4	2-	4	4	4	0	4
55	0	3	4	2-3	4	3	4-3	1-2
56	0	3	4	2	2	3	4-3	1
57	0	3-4	4	3-4	4	4	3	3
58	0	2	4-3	1	3	4	2	4
59	2	1-2	4	1-2	1	3	2-3	4
60	4	0	1	4	0-1	4	2-3	4
61	0	1-2	3	0	3	4	4	4-3
62	0	0	4	0	0-2	4	3	4
63	0	1-2	2-3	0-1	1-2	1-2	0	1-2
64	4	1	3	1	3	1+	4	1+
65	4	X	X	X	4	X	1-2+	X
66	0	3-4	4	2-3	4	0-1	4	0-1
67	0	4	4	3-4	4	3-4	3-4	2-3+
68	0	3-4	4	3-4	4	0-1	1-2	0-1
69	2-4	3	3-4	1-2	3-4	0-1	2-3	0-1
70	2-4	3-4	3-4	3	3-4	0-1	0-2	0-2
71	0	4	4	2-3	4	2-3	3-4	1-1+
72	0-1	3-4	4	2-3	4	0-1	X-4	0-1
73	0	3-4	4	3-4	4	3-4	X-4-	1-2
74	0	0	0-1	0	2-3+	0-1	0-1	0
75	0	4	4	2-3	4	2-3	0-1+	0-1
76	0	X	3-4	X	3-4	4	0-2+	4
77	4	4	4	4	4	4	4	4
78	0	3-4	3-4-	1-2+	4	X	X	X
79	0	0-1	X	0-1-	X	0-2+	0-1	X
80	4	X	3-4	X	4	X	4	X
81	0	X	X	X	X	4	1-2+	4
82	4	3-4	X	4	4	X	1-2+	3-4
83	4	1-2+	X	0-1-	3-4	X	0-2+	4
84	0	3	4	1	3-4	4	0-1	4

Physiologic Races	Type of Infection on Malakof C.I. 4898	Carina C.I. 3756	Brevit C.I. 3778	Webster C.I. 3780	Loros C.I. 3779	Mediterranean C.I. 3332	Hussar C.I. 4843	Democrat C.I. 3384
85	0	4	4	2-3	4	4	3	4
86	0	4	4	3	4	4	1	1
87	1	4	4	3	4	X	2	X
88	1	2-3	2-3	3	4	X	1	4
89	4	X	X	X	4	4	4	4
90	1	2	2	X	4	4	1	4
91	4	4	4	4	0-1	0-1	3-4	0-1
92	0	0-1	2	0	0	4	2	2
93	4	0	1	1	2	1	1	1
94	4	4	X	4	4	2-4	4	4
95	0	4	4	0	4	0	4	0
96	1	4	4	4	4	1	1	0
97	1	4	4	4	4	1	1	0
98	0	2-3	2-3	1-2	2-3	2-3	2-3	2-3
99	4	2	2	4	4	0	4	4
100	X	0	0	0	1	4	1-3	4
101	4	2-3	2-3	X	3	X	3	X
102	0	0-2	1-3	0-1	0-4	4	0-3	4
103	4	0-1	1-2+	0-1	X-3	0-X	0-1	0-3
104	4	2-4	3-4	2-4-	4	4	1-3+	4
105	4	1-2	3±	0-1	3+	4	1	4
106	0	2-3	3-4	2-3	3	0	0	0
107	0	4	4	4	4	1-2	3-4	1-2
108	4	4	4	2-3	4	0-1	3-4	0-2
109	4	2-4±	4±	2±	0	0	3	4
110	4	0-1-	1-3	0	2-4-	0-1-	0-1-	0-1
111	0	0-1+	0-3+	0-1-	0-4	1-4	0-1+	4
112	4	2-4	1-3-	4	4	X	1-3+	4
113	4	X	X	X	X	4	2-2+	4
114	4	4	4	2-3	4	4	2+	4
115	4	4	4	4	4	X	X	X
116	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3
117	4	4	4	4	4	0	4	4
118	0	3	4	4	0	0	0	0
119	4	0	4	4	0-1	0-1	4	0
120	1	0-1	3-4	0	0	0	4	0
121	4	0	0	4	0-1	0	4	0
122	4	4	4	4	4	4	2	4
123	0	0	4	0	0	0	0	0
124	0	0	2-	0	2-	2	1	4
125	3	2	2	4	2	0	2	0
126	4	1	2	1	4	4	2-	4
127	0	3	3	1	2	3	1-	4
128	4	2	2	1	3	0	4	0

Physiologic Races	Type of Infection on Malakof C.I. 4898	Carina C.I. 3756	Brevit C.I. 3778	Webster C.I. 3780	Loros C.I. 3779	Mediterranean C.I. 3332	Hussar C.I. 4843	Democrat C.I. 3384
129	4	3	4	0	4	4	4	2+
130	4	1+	1+	3+	3+	3+	3	3+
131	0	3	3	2	4	0	2+	0
132	0	2-3	2-3	0-1	2-3	0	0	0
133	0	X	1	1	4	0	4	0
134	1	X	4	4	4	1	1	0
135	0	X	X	X	X	0	X	0
136	0	1	1	X	X	4	X	4
137	0	X	X	X	X	X	X	0
138	0	X	X	4	X	0	X	0
139	0	1	1	3	3	2	1	2
140	0	2+	2+	3	3	3+	1	3+
141	0	2+	2+	2+	3	3	3	3
142	0	2-3	2-3	3	3	2-3	1	2-3
143	0	4	4	4	4	4	2-	4
144	4	3	4	0	4	4	3	4
145	4	X	4	X	4	4	4	4
146	4	X	4	X	4	0	4	0
147	4	2	4	4	4	0	4	0
148	4	2	3	X	4	0	4	0
149	4	2	4	4	4	4	4	4
150	4	4	4	X	4	4	4	4
151	0	4	3++	0	2	3++	3	4
152	4	1	3	3	4	1	1	4
153	0	3	2	2	2	4	4	4
154	0	3	1	1	4	1	0	2
155	0	4	0-2	0	4	2	3	0-2
156	0;	1+	4-	1-	3+	4-	2-	1
157	0	2	3-	3-	3-	3-	1	0
158	0	3+	3+	2	3+	1	3+	3
159	0;	1	2	3	1	4	1	4
160	4-	X	3	1	1+	0;	1	0;
161	0	2	2	1	4	4-	1	3
162	1	3	4	4	4	4	X	4
163	0	1	2+	0	3	3	1++	2

Table 2. Information on original descriptions, place and year of discovery or report of physiologic races of Puccinia rubigo-vera tritici

Physiologic Races	Described by	Country or Area	Year
1-12	Mains and Jackson	United States	1926
13-23	Scheibe	Western Europe	1930
16	Ĭ Arkina	Russia	1941
24	Dodoff	Bulgaria	1931
25	Tschalakow	Germany	1931
26	Waterhouse	Australia	1929
27	Johnston	United States	1930
28-50	Johnston and Mains	do.	1932
51-53	Schaal, Stakman, and Levine	do.	----
54	Radulescu	Rumania	1932
55-62	Sibilia	Italy	1935
63	Mehta	India	1933
64	Rudorf, Job, and Rosensteil	Argentina	1933
65	Caldwell and Compton	United States	1936
66-75	Roberts	England, Wales, Portugal	1936
76-83	Caldwell and Compton	United States	1936
84-86	Sibilia	Italy	1936
87-90	Newton and Johnson	Canada	1936
91	Buchheim and Lissitzyna	Russia	1934
92-94	Hassebrauk	Germany	1937
95-97	Waterhouse	Australia	1929, 1932
98-99	Rashevskaya and Barmenkov	Russia	1935
100	Caldwell and Compton	United States	1937
101	Newton and Johnson	Canada	1937

Physiologic Races	Described by	Country or Area	Year
102-105	Caldwell and Compton	United States	1931-1938
106-108	Mehta	India	1938
109	Verwoerd	South Africa	1937
110-113	Caldwell and Compton	United States	1940
114	Vallega	Chile	1941
115, 116	Rashevskaya and Barmenkov	Russia	1937
117-121	Barmenkov	Russia	1937
122	Vohl	Europe	1938
123	Asuyama	Japan	1939-1940
124-129	Johnston	United States	1935-1941
130	Newton and Johnson	Canada	1942
131	Johnston	United States	1947
132	Mehta	India	1950
133-138	Waterhouse	New Zealand and Australia	1952
139-142	Brown and Johnson	Canada	1949
143	do.	do.	1952
144-150	Silva	Brazil	1951, 1952
151-153	Sibilia	Italy	1943
155	do.	Ethiopia	1939
155	Hassebrauk	Germany	1952
156	Urries and Cañamas	Spain	1952
157-160	Urries and Salazar	do.	1953
161	Basile, Leonori-Ossicini, and Rosa	Italy	1954
162	Salazar	Spain	1954
163	Sibilia	Italy	1955

Table 3. Authors and culture numbers used by them in describing physiologic races to which the register numbers 133 to 163, inclusive, have been assigned.

Race No.	Author and Citation	Authors' Culture or Race Numbers
133	W. L. Waterhouse (17)	133A
134	do	134B
135	do	135A, 135B, 135AB, 135BB
136	do	136A
137	do	137B
138	do	138AB, 138BB
139	A. M. Brown and T. Johnson (2)	C1
140	do	C2
141	do	C3
142	do	C4
143	do (not published)	1946-1
144	A. R. da Silva (13)	RN1
145	do (14)	RN4
146	do	RN7
147	do	RN8
148	do	RN9
149	do	RN10
150	do	RN11
151	C. Sibilia (11)	B
152	do	R1
153	do	R2
154	do (12)	E.2
155	K. Hassebrauk (3)	Münster
156	M. J. Urries and R. Cañamas (15)	903, Race A
157	M. J. Urries and J. Salazar (16)	1064
158	do	1183
159	do	1238
160	do	1243
161	R. Basile, A. Leonori-Ossicini e M. Rosa (1)	67b and 68, races 630111
162	J. Salazar (10)	1370, race E
163	C. Sibilia (not published)	139

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